

Resilience in the face of stress: emotion regulation as a protective factor

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Introduction

Everyone experiences stress at one time or another – from major events such as the death of a loved one, to more minor stressors such as financial difficulties. Not surprisingly, exposure to stress is generally associated with a wide range of negative outcomes, including decreased well-being, increased incidence of disease, post-traumatic stress disorder, generalized anxiety disorder, and major depressive disorder (Dohrenwend & Dohrenwend, 1974; Kendler *et al.*, 1999; Monat *et al.*, 2007). However, not all individuals who are exposed to even high levels of stress develop such negative outcomes. In fact, recent evidence suggests that a considerable number of individuals exhibit resilience, which is commonly defined as maintained or improved mental health in the face of stress, after short disruptions (if any) to normal functioning (Freitas & Downey, 1998; Rutter, 1999; Luthar *et al.*, 2000); Bonanno, 2005). Note that this definition, which we adapt here, conceptualizes resilience as a potential outcome after exposure to stress rather than a psychological trait that leads to positive outcomes (c.f. Norris *et al.*, 2008).

It, therefore, appears that, in the face of comparable stressors, some individuals exhibit significantly impaired functioning while others show impressive resilience. Understanding the factors that govern the great individual variance in outcomes after stress is important for understanding mental health and for developing interventions and prevention programs that foster resilience. What factors, then, might predict resilience? One key to this question might lie in the fact that stressful events are inherently highly emotional (Sarason *et al.*, 1978; Lazarus, 1999). For this reason, people's ability to *regulate* emotions may be a critically important factor in determining resilience

(Figure 2.1). The present chapter will review relevant literatures and suggest that there is indeed evidence to support this thesis. More specifically, we will propose that a specific type of emotion regulation, *cognitive* emotion regulation, holds particular promise for contributing to resilience.

Scope of the chapter

The concepts we examine here are complex: the topics of stress, mental health, and emotion regulation each have generated a vast body of research. To maintain conceptual clarity, the chapter will focus on specific types of stressor, specific types of emotion regulation, and specific types of relationship between these constructs and resilience. This is achieved as follows.

The first way in which the present review is narrowed is by focusing on stressful life events from among the various types of stressor that can affect people (Sarason *et al.*, 1978; Lu, 1994; Ensel & Lin, 1996; Mazure *et al.*, 2000; Tennant, 2002). Common stressful life events include relatively minor events, such as a disagreement with a spouse, to more major events, such as the unexpected loss of a job, a serious illness or injury of oneself, or the death of a friend or family member. Because this definition of stress exposure includes stressors that, arguably, everyone has experienced one time or another, the present model of resilience is fairly general in its implications. However, the stressors will not include traumatic events such as abuse, exposure to crime, or exposure to war, or events that could be considered “positive” stressors such as marriage or the birth of a child, because, based on the current literature, it is not clear whether the proposed model of resilience would generalize to these types of stressor. While it is possible that cognitive emotion regulation ability is also an important contributor

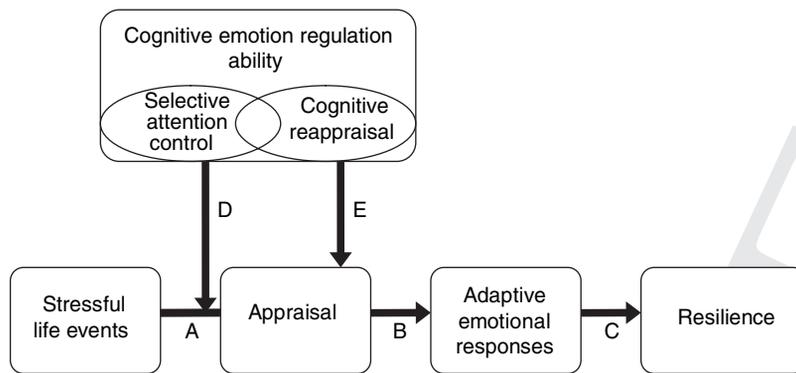


Figure 2.1 Proposed moderation of the relationship between stressful life events and resilience by cognitive emotion regulation ability. Each of the links in the model is indicated by a letter (A–E). Links D and E are positioned to imply that D usually occurs earlier in the emotion generative process than E, and that E operates by directly changing appraisals; however, this is not meant to imply a strict time course with regard to cognitive emotion regulation. The links are described in detail in the text.

to resilience with regard to trauma and positive events, more research is needed in order to test this hypothesis.

Second, the proposed framework will focus on emotion regulation ability as a *moderator*, such that people with high cognitive emotion regulation ability should exhibit increased likelihood of resilience after stress exposure compared with those low in cognitive emotion regulation ability (Figure 2.1). Emotion regulation has also been proposed as a *mediator* in the context of adjustment to stress (Schwartz & Proctor, 2000; McCarthy *et al.*, 2006; Silk *et al.*, 2007). According to such mediator models, stress exposure leads to emotion dysregulation, which, in turn, leads to negative outcomes. Both mediator and moderator models are useful in examining the relationship between stress and mental health. The present chapter focuses on emotion regulation as a moderating factor because a moderator model lends itself more clearly to understanding individual differences in resilience. One implication of this approach is that emotion regulation ability is conceptualized as a relatively independent variable that is not strongly affected by stress exposure. This is not to say, however, that this ability is set in stone. Rather, we believe that the ability to use cognitive emotion regulation is shaped and influenced by a number of situational and individual factors, and it can, in turn, be flexibly applied across a wide range of emotional contexts. According to this model of resilience, however, the ability to use cognitive emotion regulation is most important in the context of stress.

In order to provide evidence for the moderator model of resilience shown in Figure 2.1, empirical evidence that supports main effects of cognitive emotion regulation on positive outcomes will be reviewed,

as well as evidence that cognitive emotion regulation is a moderator of the relationship between stress and outcomes. Studies of the main effects of emotion regulation do not directly test resilience because they do not explicitly consider the context of stress. However, evidence of this type will be included for two reasons. First, the literature to date has simply focused more on the main effects of emotion regulation. Second, and more importantly, we believe that the relationship between cognitive emotion regulation and positive outcomes is likely to generalize to stressful contexts. In addition, where research has directly tested the interactions between emotion regulation and stress, it is described as evidence that directly supports the moderator model.

In order to lay the groundwork for the present review, appraisal theories of emotion and cognitive emotion regulation are discussed.

A framework for resilience: appraisal theory and cognitive emotion regulation

Appraisal theories are commonly used in the fields of emotion, emotion regulation, and coping to understand individuals' emotional reactions (Lazarus & Folkman, 1984). The central point of appraisal theories is that "the way we evaluate an event determines how we react emotionally" (Lazarus, 1999, p. 87). In other words, it is not a particular event that causes a particular emotion but, rather, it is a person's subjective appraisals of the event that lead to an emotional reaction (Lazarus & Folkman, 1984; Ortony *et al.*, 1988; Scherer, 1988; Lazarus, 1991). In this way, appraisals have generally been defined as the meaning and significance that a person assigns to an event or stimulus.

In support of appraisal theories, research has found that people exposed to comparable events, either in the laboratory or in a naturalistic setting, will display a wide variety of emotional reactions depending on their appraisal of the event (Folkman & Lazarus, 1985; Smith & Ellsworth, 1987; Scherer & Ceschi, 1997; Siemer *et al.*, 2007; Figure 2.1, links A and B). Because appraisals appear to play such an important role in the generation of an emotion, emotion regulation strategies that target appraisals should be particularly effective. Consequently, once an individual's appraisal of a situation has changed, so will the emotional reaction.

Given the centrality of appraisals in the generation of emotion, cognitive emotion regulation strategies that entail appraisal change may provide particularly effective ways to manage emotions. Cognitive emotion regulation has been broadly defined as changing one's attention to or one's appraisals of a situation in order to change an emotion's duration, intensity, or both (Ochsner & Gross, 2005). This definition is in contrast to non-cognitive types of emotion regulation such as expressive suppression, which consists of changing only the outward expression of an emotion (Gross & Thompson, 2007).

Two groups of cognitive emotion regulation strategies have shown particular promise as effective ways to manage emotions: attention control (AC) and cognitive reappraisal (CR) (Ochsner & Gross, 2005). Attention control consists of selectively attending toward or away from certain stimuli (either internal or external) in order to change their emotional impact (Ochsner & Gross, 2005). Note that internal stimuli are included in this definition, which refers to people's own thoughts and feelings. Selective attention to certain aspects of a situation changes individuals' appraisals, which, in turn, changes individuals' emotional states. For example, consider someone who is faced with giving a speech to a large crowd of people and chooses to focus on how friendly and engaged everyone in the first row looks. This person's appraisal of the situation will be less threat provoking than that of someone who instead focuses on the people who are asleep in the back row. Essentially, by filtering the affective information that enters one's awareness in a stressful situation, the appraisals one makes will be less threatening, in turn leading to fewer negative emotions (Figure 2.1, links A, B, and D). In this way, AC is conceptualized as a moderator of the relationship between stressful life events and appraisals.

Cognitive reappraisal involves reframing a situation in order to change its emotional impact. In the

context of stress, this could involve changing one's appraisal to another less-threatening or more positive interpretation of the event (Gross & Thompson, 2007). Because CR most often occurs after an initial appraisal of an event has taken place, it is depicted as occurring slightly later in the emotion generation process than AC (Gross, 1998a; Figure 2.1, link E). We acknowledge that it is possible for CR to occur either earlier or later in the generation of emotion than described in this definition. In the proposed model, however, the temporal sequence of these strategies is not critical for determining their effectiveness. Instead, we believe that the ability to change appraisals is what ultimately determines the effectiveness of a given strategy. Going back to the public speaking example, one could initially look out at the huge audience and make the appraisal that this audience appears quite uninterested in the impending talk and is, therefore, threatening. Then, one could reappraise the situation by telling oneself that the few people who are paying such close attention could have great feedback that could really help to improve the speech in the future, thereby decreasing anxiety. By using CR to change appraisals of a threatening situation, individuals can effectively transform their ensuing emotions (Figure 2.1, links E and B).

Clearly, there is some overlap between AC and CR. Because attention and appraisals appear to be critically linked, it may be that the use of one of these strategies makes it more likely that the other strategy will also be used (Totterdell & Parkinson, 1999). For example, it may become much easier for someone to engage in a positive reappraisal of the public-speaking situation if he or she is selectively attending to the friendly people in the front row. Conversely, as he or she is busy reappraising the audience by considering how truly unthreatening everyone is, he or she may be more likely to notice the friendly people sitting in the front row and less likely to notice the people sleeping in the back. Although AC and CR are, therefore, by no means mutually exclusive, they will be described separately to maintain conceptual clarity. To acknowledge the fact that these two types of cognitive emotion regulation are not completely separable, they are pictured as overlapping circles in Figure 2.1.

In sum, as illustrated in Figure 2.1, the appraisal-theoretical framework suggests that AC and CR may be linchpin processes in contributing to resilience. Specifically, these types of strategy for cognitive emotion regulation should contribute to resilience (link C) by helping individuals to decrease negative emotional

responses (links D and E). The following sections will review evidence to support this model.

Empirical findings: attention control and resilience

Theoretically, if a person does not attend to negative stimuli, this person will make appraisals of the environment that are less threatening. In turn, these changed appraisals will lead to fewer negative emotional reactions (Folkman & Lazarus, 1985; Gross & Thompson, 2007). For this reason, it has been widely hypothesized that the ability to distract oneself from negative stimuli, including one's own negative feelings, is an important protective factor against long-term negative outcomes. In the context of depression, for example, Nolen-Hoeksema (1991, p. 577) hypothesized that depressed individuals must "be distracted from their ruminative thoughts long enough for their depressed mood to be relieved substantially." Laboratory studies of distraction support this hypothesis. For example, in studies with depressed patients as well as normative samples, participants who distracted themselves from their sad moods by completing an emotionally neutral task were able to attenuate their negative feelings (Morrow & Nolen-Hoeksema, 1990; Erber & Tesser, 1992). Similarly, in a group of depressed adolescents, Park and colleagues (2004) found that participants induced to use distraction by reading about 45 neutral items (boats, kettle, etc.) decreased their depressed mood compared with participants who read about more emotional, self-focused items (feelings, body sensations, etc.).

While these laboratory studies suggest that distraction staves off depressed mood, the positive effects associated with distraction seem to wear off with time, giving those who use distraction only short-term benefits. For example, Kross and Ayduk (2008, study 2) found that after a laboratory sadness induction distraction decreased depressed mood immediately after the emotion induction. However, in follow-up sessions one day and seven days after the induction, the protective effects of distraction had disappeared and levels of self-reported depressed mood had significantly increased relative to other experimental groups that had not used distraction. The authors explained these results by pointing out that distraction does nothing to change how emotional experiences are dealt with in future situations; consequently, the utility of distraction appears to be limited to the short term (Kross & Ayduk,

2008). This is similar to the contention of Campbell-Sills and Barlow (2007, p. 556) that distraction is simply "a 'band-aid' approach rather than a long-term solution to excessive anxiety and/or depression." Indeed, there is evidence to suggest that distraction may be not just ineffective but even detrimental to long-term coping. For example, research has found that individuals who use avoidance coping strategies such as distraction when they are stressed are more likely to develop depression in the long run (Felsten, 2002; Powers *et al.*, 2002; Holahan *et al.*, 2005).

Given the negative long-term consequences associated with distraction, perhaps its opposite – focusing on what is wrong in a given situation – could lead to more positive outcomes. This negative focus is often referred to as rumination, which has been defined as repetitively focusing on oneself, one's negative emotions, and their anticipated negative consequences (Nolen-Hoeksema, 1991; Nolen-Hoeksema *et al.*, 2008). Unfortunately, this ruminative response style in the face of stress decreases the likelihood of resilience. For example, among people who are already depressed, those who engage in rumination about their own depressed mood experience significantly longer depressive episodes, which suggests that rumination leads to a vicious cycle of negative emotions that are difficult to escape (Nolen-Hoeksema, 1991). The use of rumination has also been associated with higher levels of anxiety and symptoms of post-traumatic stress (Nolen-Hoeksema *et al.*, 2008). This relationship between rumination and negative outcomes also seems to be present in the context of stress. In a study of caregivers for terminally ill patients, for example, results indicated that caregivers who used more rumination in response to their negative moods were more depressed than caregivers who used less rumination (Nolen-Hoeksema *et al.*, 1994).

Such correlational studies, of course, do not allow for inferences about the causal role of rumination. Importantly, however, a prospective study by Nolen-Hoeksema and Morrow (1991) provided some support for the notion that rumination is a risk factor for depression. Their questionnaire study obtained participants' reports of ruminative response style and depressive symptoms. By chance, 14 days later, the Loma Prieta earthquake hit the area close to where these data had been collected. Participants who had previously reported using more of a ruminative response style were significantly more depressed at follow-up sessions 10 days and 50 days following the earthquake compared with individuals who reported using less of

a ruminative response style. These results were significant even when controlling for depressed mood before the earthquake, suggesting that rumination indeed had a causal role in depressed mood. Several other prospective longitudinal studies using both adults and children have found a similar pattern: individuals who use rumination during periods of stress are more likely to develop depressive disorders and to experience more prolonged periods of depression in the long-run (reviewed by Nolen-Hoeksema *et al.*, 2008).

More recent laboratory studies that have manipulated the use of rumination have added further support to the contention that rumination plays a causal role in the occurrence of negative mood states. For example, Singer and Dobson (2007) found that remitted depressed patients who were instructed to ruminate after a negative emotion induction had higher levels of depressed mood compared with participants who were instructed to use distraction. Other studies using normative samples have also found that instructions to ruminate after negative mood inductions exacerbate negative mood states compared with those who were not instructed to ruminate (Broderick, 2005; Ray *et al.*, 2008). Overall, it seems that when people in stressful situations repetitively focus their attention on their own negative emotions, resilience becomes a less likely outcome.

In addition to the studies on rumination, research on attentional biases in depression suggest that a bias towards external negative affective stimuli (i.e., negative stimuli other than one's own emotional states) might also decrease the likelihood of resilience and lead to increased vulnerability to negative outcomes. In several studies using paradigms such as the dot-probe task, researchers have found that clinically depressed patients (Mogg *et al.*, 1995; Mathews *et al.*, 1996) as well as individuals with induced or naturally occurring dysphoria (Bradley *et al.*, 1997) displayed a negative attentional bias, attending relatively more to negatively valenced emotional stimuli than to neutral or positive stimuli. This negative attentional bias in depression has also been found using other tasks such as the dichotic listening task (Ingram *et al.*, 1994) and an affective interference task (Gotlib *et al.*, 2005).

In addition, using a negative affective priming task to measure selective attention to affective words, Joormann (2004) found an attentional bias towards irrelevant negative distractors in participants who were currently dysphoric, as well as in non-depressed individuals with a previous history of depression.

Furthermore, a sample of children at high risk for depression selectively attended to negative facial expressions after a negative mood induction, whereas children who were not at risk for depression selectively attended to positive facial expressions during an emotional faces dot-probe task (Joormann *et al.*, 2007). These findings suggest that negative attentional bias is not simply a side-effect of current depression, but may constitute a vulnerability to depression.

Taken together, these findings suggest that there is a main effect between AC and mental health outcomes. Specifically, distraction, rumination, and negative biases in attention are associated with vulnerabilities to negative outcomes over time. In addition, the findings reviewed above could have important implications in the context of stress and resilience – if an individual cannot effectively disengage attention away from negative aspects of themselves or the situation, the appraisals of a stressor could become much more threatening, the resulting negative emotions could become more intense and long lasting, and resilience will become more difficult to attain. At the other extreme, however, those who completely distract themselves away from negative information enjoy short-term benefits but appear ill-equipped to effectively cope with further exposure to stressors later on.

Indeed, research using the emotional Stroop task, which measures individual' ability to ignore irrelevant emotional material, has provided evidence that pre-existing differences in AC can prospectively predict adjustment to stress. For example, MacLeod and Hagan (1992) found that women who displayed the most pronounced bias towards negative information later reported the greatest amount of distress upon learning that they had been diagnosed with cervical pathology. Similarly, MacLeod (1999) found that a Stroop measure predicted Singaporean students' emotional adjustment after migrating to Australia. Specifically, the students with the most pronounced negative attentional bias reported the greatest levels of anxiety after immigration.

These prospective studies support the hypothesis that individual differences in AC can exert a moderating effect on the relationship between stress and outcomes over time (Figure 2.1, link D). Specifically, maladaptive forms of AC such as negative attentional biases appear to result in heightened negative affective responses (Figure 2.1, link D) and are associated with more vulnerability to negative outcomes and less resilience (Figure 2.1, link C).

Conversely, then, individuals who use adaptive AC should respond to a stressor with an attenuated negative affective response, making resilience more likely. However, what constitutes “adaptive AC”? The findings reviewed so far suggest a dilemma: directing attention away from the negative aspects of a situation (as is done in distraction), on the one hand, is only adaptive in the short term but seems to have deleterious consequences in the longer term. On the other hand, focusing on the negative aspects of a situation (as is done in rumination) appears to lead to deleterious consequences in almost all contexts. One answer to this dilemma might lie in the degree and context rather than in the kind of AC strategies used. Perhaps it is just maladaptive to *completely* and *inflexibly* distract oneself from or *completely* and *inflexibly* focus on negative stimuli. In contrast, a more flexible employment of some of both strategies – *selectively* focusing attention – could lead to resilience in the face of stress. Additionally, the maladaptive types of AC described above are stimulus-driven strategies. Perhaps more goal-driven strategies based on an individual’s present goals and needs would be more adaptive. In this way, selective AC could be employed flexibly across a wide range of contexts in order to suit an individual’s current needs instead of according to particular stimulus contingencies.

Indeed, studies of selective attention support this hypothesis. For example, recent research using eye-gaze tracking has found that individuals who are high in trait optimism – that is, individuals who are generally characterized by high well-being – display an attentional bias away from negative material (Isaacowitz, 2005). At first glance, this looks like distraction. However, research from Aspinwall and Brunhart (1996) suggests that optimists are not using chronic Pollyannaism to simply filter out all negative information; instead, optimists appear to attend only to what is relevant for their own well-being. For example, they found that when optimists who engage in habitual sun tanning were given health information about damage from ultraviolet radiation, they spent more time reading the threatening information, whereas optimists who did not habitually sun tan did not selectively attend to the same information. The optimists also displayed better recall for the relevant health risk information than for irrelevant information, adding to the contention that optimists do selectively attend to negative material if it is relevant (Aspinwall & Brunhart, 1996). More recent research on optimism has replicated these results (Abele & Gendolla, 2007).

These findings on optimists have led to the “pragmatic information-processing hypothesis,” which posits that it is not the valence of information that drives selective attention in optimists but rather the level of personal relevance that will determine whether affective information is attended to or not (Abele & Gendolla, 2007).

With these findings in mind, it is not surprising that optimists tend to exhibit greater levels of well-being and lower rates of depression than pessimists (Scheier & Carver, 1993). By filtering out unneeded negative information, the optimists’ appraisals of these stimuli may be less disturbing, leading, in turn, to fewer negative emotions. Although this phenomenon has not been examined in the context of high stress, it is plausible that optimists avoid the negative effects of distraction by attending to negative information when it is relevant. At the same time, when negative information becomes irrelevant, perhaps because it has been processed, optimists may effectively direct attention away from it. Hypothetically, by attending away from unneeded information in the environment, individuals with this type of selective attention would display less-threatening appraisals of the stressor in the first place, thus leading to an attenuated negative emotional response and resilience.

Does this mean that if someone does not naturally possess the ability to selectively focus attention away from negative stimuli, that person is doomed if stressors arise? Recent studies that have examined training paradigms for selective attentional biases suggest that the answer to this question is negative. These studies have shown that, with training, pre-existing attentional bias patterns can be changed (either acquired or attenuated). For example, in a laboratory study, participants were taught to acquire attentional biases either toward or away from affectively negative versus neutral stimuli using a computer task (MacLeod *et al.*, 2002, study 1). After completing the training procedure, participants in the negative attention condition exhibited greater bias towards negative stimuli while participants in the neutral attention condition exhibited greater bias towards neutral stimuli. A more recent study of attentional bias training extended the findings of MacLeod *et al.* by showing that positive attentional biases can also be taught (Wadlinger & Isaacowitz, 2008). These positive biases also have observable behavioral effects on subsequent tasks, such that the participants who had been trained to attend to positive stimuli subsequently looked less at negative images during a stress induction (Wadlinger & Isaacowitz, 2008).

These findings are important in suggesting that people's selective attention to emotional stimuli seem to be changeable. Such training procedures may have important therapeutic value for promoting resilience, particularly among individuals with pre-existing negative attentional biases. In a follow up study, MacLeod and colleagues (2002, study 2) indeed found that participants who had learned to exhibit a negative attentional bias responded to a stress induction with a pronounced increase in negative emotions. Participants who had been trained to attend away from the negative stimuli and towards neutral stimuli did not exhibit this increase in negative emotion. The authors concluded that the acquired attentional biases contributed causally to these differences in negative emotions. These findings are very important in providing evidence that individual differences in selective AC might influence emotional adjustment to a stressor (Figure 2.1, link D).

It is promising to think that people who exhibit maladaptive patterns of AC can be led down a more resilient path by learning to attend to different kinds of stimulus in the environment. Indeed, recent work by Siegle and colleagues (2008) suggests that training in selective AC may be an effective treatment component for depression. They used an adjunctive intervention for depression called cognitive control training – importantly, the protocol for included AC training, in which patients learnt to selectively attend to certain sounds coming out of speakers, while ignoring irrelevant sounds. After receiving two weeks of this AC training (in the context of cognitive control training), patients exhibited greater improvements in depressive symptoms than patients who received treatment as usual (Siegle *et al.*, 2008). Notably, the AC training consisted of short sessions (15 minutes) that used non-affective stimuli such as bird sounds. This suggests that this particular type of AC training may be tapping into a generic ability that is not simply limited to affective stimuli. In turn, this type of generic ability may make it more likely that people can use it in a flexible and context-dependent way.

Although these training paradigms have not been examined in the context of long-term adjustment to stress, the optimism literature discussed above suggests that the flexible use of these attentional biases across contexts would be most adaptive. For example, individuals who display biases away from irrelevant negative information but who attend to relevant negative information would be most likely to be resilient in the long term. Taken as a whole, these training studies suggest

that selective AC is best conceptualized as an ability that can be improved with practice. Furthermore, they provide support for the hypothesis that selective AC plays an important role with regard to adaptive emotion regulation and resilience.

Clearly, more research is needed on the clinical utility of AC. As mentioned above, blind Pollyannaism is not the answer to coping with stress. Rather, research suggests that selective AC is most adaptive, with attention paid to relevant but not irrelevant negative stimuli. It is unclear, however, how people coping with real-world stressors decide which negative information is “irrelevant” and could, therefore, be safely ignored. One promising idea is that “relevant” information, in the context of stress, can best be conceptualized as the aspects of the stressor that are changeable, and therefore subject to active problem solving and coping. Unchangeable aspects of a stressor could perhaps be considered “irrelevant” and filtered out using selective AC, thereby reducing the amount of negative information that enters awareness. This hypothesis has not yet been tested, however.

Taken together, the evidence reviewed in this section supports the moderating effect of AC on the relationship between stress and resilience. Specifically, strategies such as distraction and rumination appear to be maladaptive: by indiscriminately diverting attention away from negative stimuli (as in distraction), or indiscriminately focusing attention on negative stimuli (as in rumination), individuals who use these strategies are more vulnerable to outcomes such as depression in the context of stress. Although these two different strategies appear to be opposites, ironically, they both lead to negative outcomes over time, perhaps because of the cumulative aspect of ineffectively regulated negative emotions. The AC strategies that promote resilience, by comparison, appear to involve selectively attending away from irrelevant negative stimuli and towards more positive or neutral stimuli, suggesting that a more modulated attentional response (instead of the extreme approaches of distraction and rumination) is more adaptive in the context of stress. Therefore, by filtering out unnecessary negative information in a goal-directed way (Figure 2.1, moderation, link D), it becomes more likely that individuals will make less-threatening appraisals of stressful situations (Figure 2.1, link A) and, as a result, will experience fewer negative emotions (Figure 2.1, link B), in turn increasing the likelihood of resilience (Figure 2.1, link C). The next section will examine the main effects and the

moderating effects of another type of cognitive emotion regulation strategy, CR, in the context of stress and resilience (Figure 2.1, link E).

Empirical findings: cognitive reappraisal and resilience

In contrast to AC, CR usually takes place after an initial appraisal has been made (Figure 2.1). Often, CR involves reframing an emotionally negative situation in a more positive way to decrease feelings of negative emotion (Gross, 1998a; Gross & Thompson, 2007). Notably, however, CR can also be used to increase the experience of positive emotions (Folkman & Moskowitz, 2000; Shiota, 2006; Krompinger *et al.*, 2008). Because of its direct impact on appraisals, CR has been widely hypothesized to be an adaptive strategy, particularly in the context of stress – by reappraising a stressor in a less negative and/or more positive way, individuals can change their emotional reaction to the stressor for the better.

Neuroimaging studies of reappraisal have supported the hypotheses that this strategy is effective in changing the activation of brain regions associated with emotion, such as the amygdala and the insula. These areas of the brain can be either increased or decreased in activity in accordance with the goal of reappraisal (Ochsner & Gross, 2005, 2008; Urry *et al.*, 2006; Eippert *et al.*, 2007; Goldin *et al.*, 2008). For example, when reappraisal was used to decrease negative emotions, results indicated that the experience of negative emotion was reduced, and activity in the amygdala and insula was decreased (Goldin *et al.*, 2008). In addition, neuroimaging studies comparing distraction to reappraisal have found that these two strategies are supported by different areas of the brain, suggesting that people who claim to use reappraisal are not simply distracting themselves from negative stimuli (Kalisch *et al.*, 2005, 2006).

Behavioral and autonomic-physiological studies lend further support to the hypothesis that CR can effectively change the experience of emotions without negative “side-effects.” For example, Gross (1998b) showed emotional film clips to undergraduates and asked them to reappraise their emotions, suppress emotional behaviors, or simply watch the film. Results from this and similar laboratory studies indicate that individuals instructed to use CR report experiencing less negative emotion than the other experimental groups, but show no maladaptive physiological responding (Lazarus *et al.*, 1965; Dandoy & Goldstein,

1990; Gross, 1998b; Jackson *et al.*, 2000). Subsequent research using self-report trait measures of reappraisal have extended Gross’ findings by examining the affective consequences of individual differences in CR use. For example, Mauss and colleagues (2007) found that individuals who reported frequently using CR as an emotion regulation strategy – relative to those who reported not using this strategy – experienced less anger and an adaptive pattern of physiological responding in a laboratory anger provocation.

Extending these findings beyond the laboratory, Gross and John (Gross & John, 2003; John & Gross, 2004) have examined the consequences of CR use for individuals’ well-being in daily life. They found that individuals who report frequently using CR (“reappraisers”) also report greater overall well-being. Together, these studies suggest that there are individual differences in CR use, and that those who report using CR are able to effectively downregulate their experience of negative emotion. In addition, reappraisers also seem to be rewarded with increases in positive outcomes over time, which supports the claim that CR has an important main effect on resilience. Specifically, those who use CR across a wide range of negative emotional contexts are more likely to experience positive outcomes and less likely to experience negative outcomes.

Studies that have examined the upregulation of positive emotions using CR have provided converging evidence. For example, the study of individual differences in CR and responding to an anger induction also showed that individuals who reported frequently using CR experienced more positive emotions during laboratory anger induction (Mauss *et al.*, 2007). In the context of high stress, Folkman and Moskowitz (2000) noted that, among caregivers for people with AIDS, those who reported frequently using reappraisal consistently experienced more positive emotions both during caregiving and after the death of the patient. Specifically, these caregivers used positive reappraisal to change the meaning of the negative situations they were experiencing. For example, many thought about how their efforts were benefiting their patients. In another study on daily stressors among undergraduates, Shiota (2006) found that the self-reported trait use of positive reappraisal was positively associated with positive affect. These studies together support the notion that CR can be effectively used to increase one’s experience of positive emotions even in highly stressful situations.

Although research on CR has focused considerably less on increases in positive emotion than on decreases in negative emotion, some studies suggest that experiencing positive emotions in the face of stress is an important facet of achieving resilience. In support of this point, resilient individuals are more likely to find positive meaning in the stressors they experience (Moskowitz, 2001; Tugade & Fredrickson, 2004). Fredrickson and colleagues (2003, p. 367) posited that this is because resilient people “use positive emotions strategically or intelligently to achieve their superior coping outcomes.” This strategic use of positive emotional experience is likely based, in part, on adaptive emotion regulation strategies such as CR. For the remainder of the chapter, the term CR will be used to refer to both the upregulation of positive emotions and the downregulation of negative emotions, unless otherwise noted.

The studies reviewed so far suggest that CR is associated with positive outcomes in healthy populations. Additional research suggests that CR also explains variation in mental health. For example, across a series of studies, Garnefski and colleagues have found a consistent negative association between self-reported use of CR and depression (Garnefski & Kraaij, 2006; Garnefski *et al.*, 2001, 2003). In addition, several longitudinal studies have found that this relationship remains robust over time. In one study using a sample of people aged 67 years and older, the negative relationship between CR and depression was replicated at a follow-up session two and a half years after the first session (Kraaij *et al.*, 2002). In another longitudinal study that examined CR in the context of high stress, Pakenham (2005) investigated outcomes in a sample of people caring for patients with multiple sclerosis. Results indicated that self-reported use of CR had a buffering effect on the relationship between stress and negative outcomes, including depression.

In order to better understand the effects of CR in the context of high stress, Carrico and colleagues (2005) conducted a longitudinal, experimental intervention using cognitive-behavioral stress management with a sample of highly stressed males with HIV. Over the treatment period of 10 weeks, men who received the intervention showed significant decreases in depressive symptomatology relative to the control group, and this decrease was mediated by self-reported increases in the use of positive reframing, a strategy similar to CR, suggesting that CR was the mechanism of positive change after the intervention.

Taken together, it seems that CR confers advantages to those who use it, suggesting that this regulation strategy may be an important factor in resilience. Specifically, the use of CR appears to change appraisals of a stressor, thus leading to an attenuated negative emotional reaction (as depicted in Figure 2.1, links E and B). This adaptive emotional reaction, in turn, appears to increase the likelihood of resilience (Figure 2.1, link C). However, some open questions still remain. First, the efficacy of CR in the context of high life stress is not yet well understood. Although some studies have examined CR in stressed populations (c.f. Carrico *et al.*, 2005; Pakenham, 2005), most of these studies included only one specific stressor, such as having HIV. This makes it difficult to know whether these findings would generalize to other types and intensities of stressor. Also, apart from a few notable exceptions (Garnefski & Kraaij, 2006; Garnefski *et al.*, 2001, 2003), most research on CR has not examined its relationship to negative outcomes such as depression and anxiety symptoms, and even fewer studies have examined the potential moderating effects of CR on resilience versus negative outcomes. This makes it difficult to know whether CR can indeed buffer people from developing negative outcomes in the context of high life stress.

Additionally, nearly all of the existing research on CR has relied on self-report questionnaire measures of the frequency of CR use. Although these trait measures of CR have proven very useful, we argue that specifically the *ability* to effectively and flexibly manage emotions across different contexts serves as an important and strong moderator of the relationship between stress and depression. It is, therefore, important to measure CR ability in addition to frequency of CR use. One last limitation of research that has relied on self-report measures of CR is the confounds inherent in self-reports, such as self-presentational biases. Going forward, it is important to use more objective laboratory measures of CR that are less influenced by self-report biases.

In our recent research, we sought to address these open questions (Troy *et al.*, 2010). We tested the idea that CR ability could act as a moderator of the relationship between stress and depression – serving as a protective factor for those who are high in CR ability, and acting as a vulnerability factor for those who are low in CR ability. To test this hypothesis, a laboratory measure of CR ability was developed that measures changes in two affective domains: self-reported

emotion, specifically sadness, and physiological responding. In order to measure CR ability in the laboratory, a sadness induction was conducted using short film clips. Ability in CR was quantified by calculating changes in sadness (using self-report and physiological changes) from a sad baseline film clip to a subsequent film clip in which the participants were instructed to reappraise. Specifically, participants were given instructions that asked them to think about the emotional situation depicted in the film in a more positive way. These instructions gave specific examples of how to reappraise, such as trying to imagine the unexpected good outcomes that the characters in the film clip could experience. Decreases in feelings of sadness and physiological indices of negative emotion when instructed to reappraise indexed the ability to use CR. This laboratory measure of CR ability was used with a community sample of 90 women who had experienced a stressful life event in the past three months. The women also filled out questionnaires that measure life stress and depressive symptoms.

The results indicated that CR ability moderated the relationship between intensity of life stress and depressive symptoms. Specifically, at high levels of stress, women who were high in CR ability exhibited significantly lower levels of depressive symptoms than women who were low in CR ability. Indeed, they were statistically indistinguishable from women who experienced low levels of life stress. At low levels of stress, CR ability did not have a moderating effect on depressive symptoms. This interaction was found using the self-reported as well as the physiological indices of CR ability. Additionally, nearly all participants reported that they tried very hard to use reappraisal when they were instructed to do so. This finding, combined with the significant interactions using both self-report and physiological changes, supports the conclusion that the observed results are not simply the product of demand characteristics or some other form of emotion regulation such as distraction.

Together, these results suggest that CR ability has important implications for resilience. First, CR only affected individuals' well-being in the context of high stress. Second, the fact that this sample contained a wide range of stressors and levels of stress suggests that CR may be an adaptive regulatory strategy across many types of stressful situation. In addition, by using a laboratory measure of CR ability, this study is one of the first to demonstrate that an ability specifically to downregulate negative emotions by using reappraisal

is an important factor contributing to adjustment to stress. Taken as a whole, the literature on stress, resilience, and CR supports a scientific model of resilience in which the ability to use CR serves as a moderator of the relationship between stress and resilience (Figure 2.1, link D) Specifically, CR can be used to change appraisals of a stressor, thus leading to an attenuated negative emotional response (Figure 2.1, link B). This downregulated emotional response is, in turn, associated with resilience (Figure 2.1, link C).

More work is needed in this area to improve understanding of the causal mechanisms, and further studies examining changes in emotions besides sadness, both positive and negative, are also warranted. The results of a recent study suggest that the ability to effectively regulate one's emotion, such as sadness, may also extend to the ability to effectively regulate other negative emotions, and even positive emotions such as joy, although this study did not look specifically at CR ability (Mikolajczak *et al.*, 2008). Additionally, the present review suggests that some *but not all* individuals are able to use CR to regulate emotions in the context of stress. This raises important questions. For example, why are some people quite good at using CR while others appear unable or unwilling to use this strategy? What processes support effective emotion regulation? While there is some preliminary evidence to suggest that specific aspects of cognitive control may support effective cognitive emotion regulation (Mikels *et al.*, 2008), this question remains to be fully explored. In addition, it remains unclear whether training paradigms (similar to those used in the selective attention literature) may allow those who are low in CR ability to increase their ability with practice. Future research on the plasticity of CR ability is needed in order to answer this open question.

An additional area for future research lies in the heterogeneity of processes involved in reappraisal. Reappraisal has been described, so far as the reframing of an emotional situation in a more positive way in order to change its emotional impact. However, there are several other ways in which reappraisal can be applied. For example, reappraisal has been used in other studies to reframe an emotional situation in a more objective, detached way (Gross, 1998b; Ochsner *et al.*, 2004), to imagine that an emotional event is being observed from a great distance (Ayduk & Kross, 2008), or to imagine that the situation is not real (Deveney & Pizzagalli, 2008). Research examining these other forms of reappraisal has found that they too appear

to be adaptive ways to decrease negative emotions. Indeed, one study that compared the utility of different reappraisal strategies found that there are multiple ways in which CR can be used to effectively down-regulate negative emotions (Ochsner *et al.*, 2004). In the context of stress and resilience, it remains unclear whether certain reappraisal strategies are more adaptive than others. It may be, for example, that distancing reappraisal is particularly adaptive for the downregulation of negative emotions in the context of uncontrollable stressors whereas positive reappraisal strategies may be more adaptive in the context of stressors that can be changed or controlled, in that this approach may facilitate appraisals that lead to more active coping and problem solving in the face of stress. Further work on optimal matching of specific reappraisal strategies to different emotional contexts will help to shed light on these hypotheses.

Lastly, the model outlined in Figure 2.1 has the potential to inform future clinical interventions. For example, several existing clinical interventions such as cognitive-behavioral stress management and cognitive-behavioral therapy target cognitive change as a mechanism for the prevention of psychological disorders as well as for growth. One important component of these therapies is to challenge distorted appraisals and replace them with more realistic, positive appraisals of a situation. This practice clearly overlaps with CR (Campbell-Sills & Barlow, 2007). The research reviewed above lends additional empirical support to these interventions. Based on this research, moreover, it seems that interventions could be particularly effective in highly stressed individuals before pathology develops. People who are highly stressed and low in emotion regulation ability may be particularly vulnerable, but also particularly responsive to treatments that are aimed at improving CR ability. Using the laboratory paradigm described above, such vulnerable people could be relatively easily identified. Clearly, more research on CR ability (both basic and applied) is warranted in order to answer these open empirical questions. Overall, however, as research in the area of CR, stress, and resilience progresses, it is our hope that more treatments might be informed by or improved upon using findings from this field. Moving forward, it is our hope that researchers and clinicians examining emotion regulation can work together to find the optimal way to promote resilient emotion regulation among at-risk populations.

Conclusions

Exposure to stress is an emotional experience for most people and, on average, stress exposure has been linked to impaired mental health outcomes such as depression. There is, however, wide variation in people's adjustment to stress – many people exhibit resilience after a stressor, while others experience negative long-term outcomes. This variance in adjustment to stress suggests that there must be some endogenous factors that serve a protective role: those who possess these factors are more likely to experience resilience, while those who do not are more vulnerable to negative outcomes. Because of the emotional nature of stressors, there has been an increasing focus on individual differences in emotion regulation as one such potential protective factor. Based on appraisal theories of emotion, which argue that it is one's appraisal of a stressor that leads to an emotional reaction (Figure 2.1, links A and B), we have put forth a framework for resilience (Figure 2.1). In this framework, the ability to use cognitive emotion regulation to adaptively change appraisals of a stressor moderates the relationship between stress and resilience. By changing one's appraisals of a stressor, the resulting emotions can be changed in adaptive ways, leading to increased chances of resilience even in highly stressful situations (Figure 2.1, link C).

To support the proposed framework, two different types of cognitive emotion regulation that appear to be particularly effective at changing appraisals in the context of stress have been explored. First, a review of studies of AC suggested that adaptive strategies in the context of stress consist of using AC selectively and flexibly according to an individual's current goals rather than in rigid, inflexible ways. For example, it appears to be maladaptive to attend to negative stimuli when they are irrelevant to one's well-being but it is adaptive to do so when they are relevant. People who are able to flexibly and effectively use this type of AC appear to be more resilient in the long term, while people who use maladaptive, stimulus-driven types of AC such as distraction and rumination are more vulnerable to long-term negative outcomes such as depression (Figure 2.1, link D).

Second, the role of CR, another form of cognitive emotion regulation, was examined. This consists of reframing emotional stimuli to decrease their negative emotional impact. The literature suggests that CR can be used to change the intensity of negative emotions in

response to stressful situations. In the context of high life stress, individuals who report frequently using CR are less likely to exhibit depression. In addition, recent work suggests that CR ability moderates the relationship between stress and depression. In this way, CR ability may be playing an important protective role for those individuals who are able to effectively reappraise in the context of stress (Figure 2.1, link E).

In summary, it appears that the ability to use both types of cognitive emotion regulation serves as a protective factor against the development of negative outcomes in the context of stress. People who are able to use cognitive emotion regulation strategies in adaptive ways when experiencing stress are able to effectively manage the intensity of their negative emotions by changing the appraisals that they make. When these negative emotions are effectively and adaptively down-regulated, resilience becomes more likely.

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